

Hardware efficient fast computation of the discrete fourier transform

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Abstract Typographical errors were printed in the print and online versions of the original article. The correct versions of Equation 25 (page 168), Figure 6(c) (page 169), and Table 2 (page 170) are printed below, respectively.

The online version of the original article can be found at
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$$R.D. = 2 \sum_{i=1}^{r-1} \left(\prod_{j=1}^r N_j \right) + \sum_{i=1}^r D(D_{N_i}) + 2|N_r - N_{r-1}| \cdot \min(N_{r-1}, N_r) \quad (25)$$

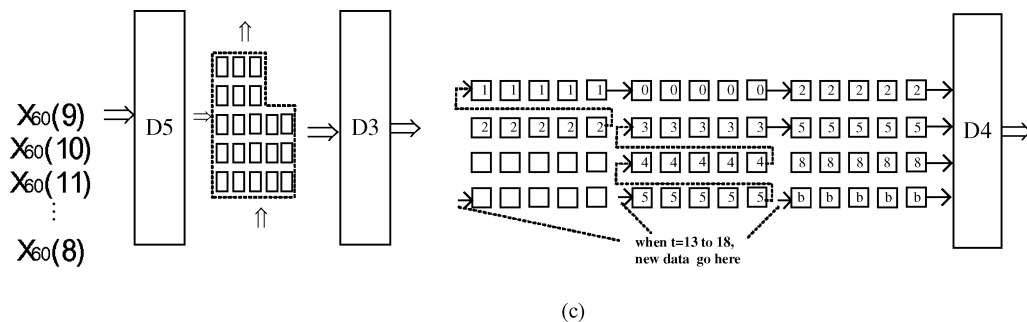


Figure 6. Data flow of proposed 60-point DFT.

Table 2. Comparison between proposed DFT structures and previous DFT design with computational complexity $O(\log N)$ in terms the number of required real multiplications (*R.M.*), real additions (*R.A.*), delay elements (*R.D.*) for real data and computation time cycles for a complete DFT (*R.T.*).

| DFT of $O(\log N)$ [6] | | | | | Proposed DFT structures | | | | |
|------------------------|---------------|---------------|---------------|---------------|-------------------------|---------------|---------------|---------------|---------------|
| | <i>R.M.</i> | <i>R.A.</i> | <i>R.D.</i> | <i>R.T.</i> | | <i>R.M.</i> | <i>R.A.</i> | <i>R.D.</i> | <i>R.T.</i> |
| <i>N</i> | <i>R.M./N</i> | <i>R.A./N</i> | <i>R.D./N</i> | <i>R.T./N</i> | <i>N</i> | <i>R.M./N</i> | <i>R.A./N</i> | <i>R.D./N</i> | <i>R.T./N</i> |
| 16 | 16 | 24 | 38 | 16 | 20 | 8 | 34 | 80 | 8 |
| | 1 | 1.5 | 2.4 | 1 | (4×5) | 0.4 | 1.7 | 4 | 0.4 |
| 32 | 20 | 30 | 72 | 32 | 28 | 12 | 38 | 132 | 12 |
| | 0.625 | 0.94 | 2.26 | 1 | (4×7) | 0.429 | 1.375 | 4.7 | 0.43 |
| 64 | 24 | 36 | 138 | 64 | 60 | 12 | 48 | 202 | 24 |
| | 0.375 | 0.56 | 2.2 | 1 | (4×3×5) | 0.24 | 0.8 | 3.4 | 0.40 |
| 128 | 28 | 42 | 266 | 128 | 140 | 20 | 56 | 454 | 60 |
| | 0.22 | 0.33 | 2.1 | 1 | (4×5×7) | 0.143 | 0.4 | 3.24 | 0.43 |
| 256 | 32 | 48 | 526 | 256 | 280 | 24 | 92 | 734 | 120 |
| | 0.125 | 0.188 | 2.12 | 1 | (8×5×7) | 0.086 | 0.33 | 2.62 | 0.43 |
| 512 | 36 | 54 | 1040 | 512 | 660 | 32 | 78 | 1956 | 300 |
| | 0.07 | 0.106 | 2.04 | 1 | (4×3×5×11) | 0.049 | 0.118 | 2.96 | 0.45 |
| 1024 | 40 | 60 | 2066 | 1024 | 1540 | 40 | 86 | 4336 | 700 |
| | 0.039 | 0.059 | 2.02 | 1 | (4×5×7×11) | 0.026 | 0.056 | 2.8 | 0.45 |
| 2048 | 44 | 66 | 4166 | 2048 | 3080 | 44 | 122 | 7316 | 1400 |
| | 0.022 | 0.032 | 2.01 | 1 | (8×5×7×11) | 0.014 | 0.04 | 2.375 | 0.45 |